Cisco SP Strategy Focus

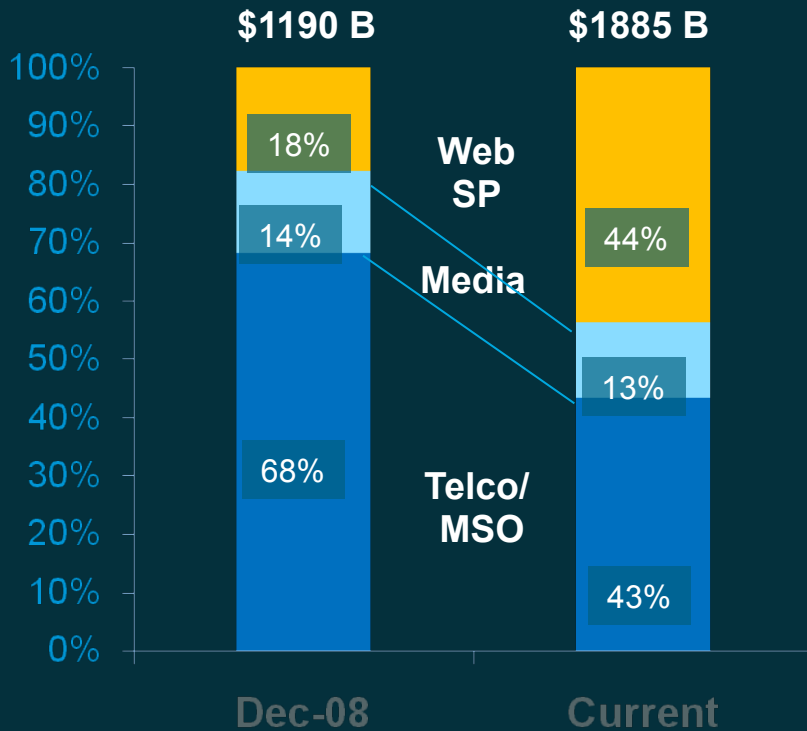**PONC**

High End Routing & Optical Group (HERO)

Sri Hosakote – VP/GM, HERO Group

November 2012

Global Market Cap Trends: Value Shift Underway

Market Cap Trends for select Global SPs

$1190 B

$1885 B

Dec-08 chart:
- 18% (Media)
- 14% (Web SP)
- 68% (Telco/MSO)

Current chart:
- 44% (Web SP)
- 13% (Media)
- 43% (Telco/MSO)

Web SP

Media

Telco/MSO

Dec-08

Current

- The market is shifting their bets to the web players
- Web SPs are ahead in creating consumer experiences
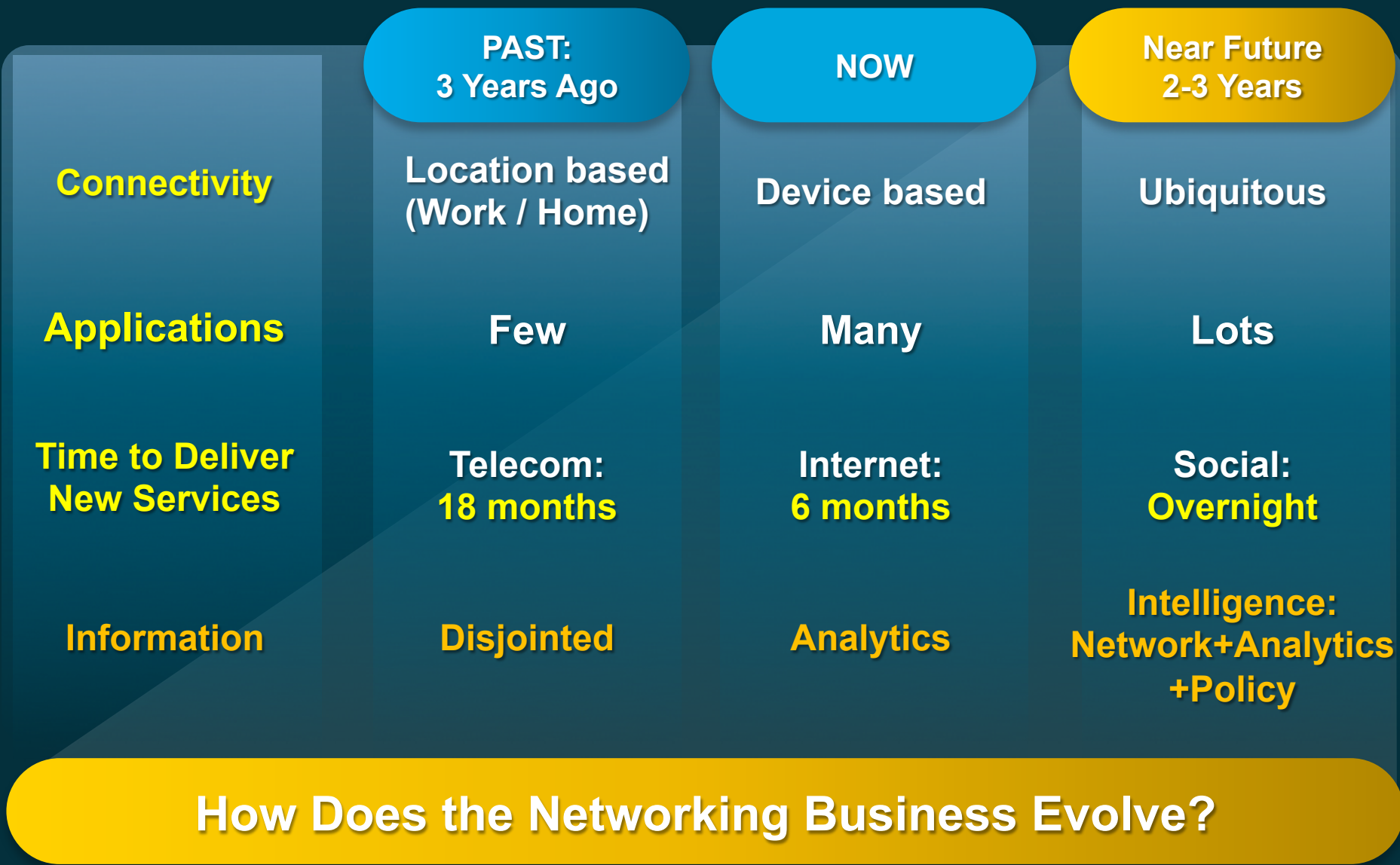- "Value" is shifting away from core infrastructure to applications

Web SP: Apple, Google, Amazon, Facebook, Yahoo, Baidu, eBay, LinkedIn, Sina Corp, AOL

Media: Disney, NewsCorp, TW, Viacom, China Television Media, British Sky , Direct TV, Shanghai Xinhua Media Co, Thomson Reuters, CBS

Telco/MSO: AT&T, Verizon, Comcast, TWC, China Mobile, Vodafone, Telefonica, America Movil, France Telecom, Deutsche Telekom
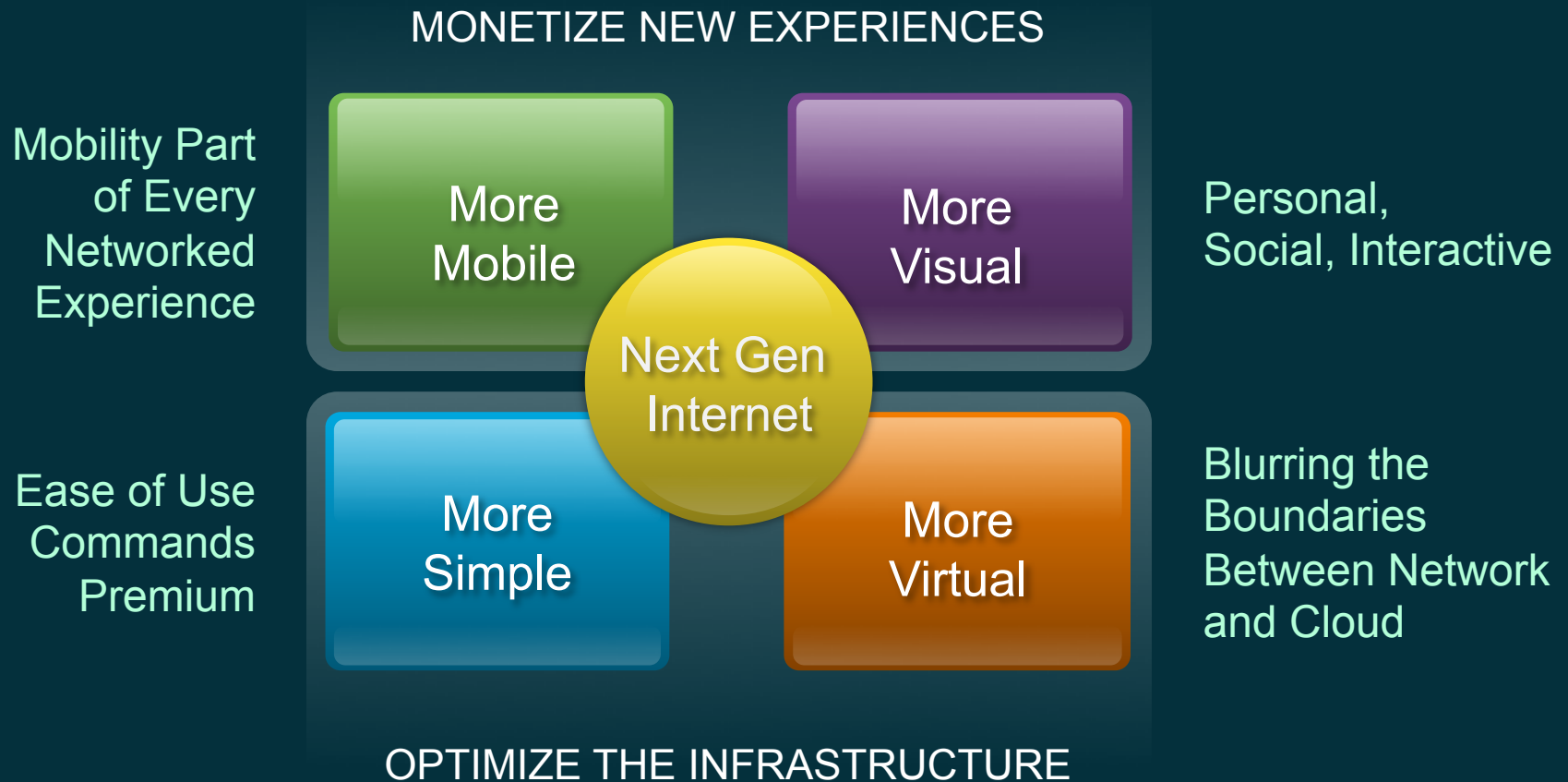
SPDR Dow Jones Industrial Average (DIA) 85.07 → 127.85

Source: Thomson One

The New Normal?

	PAST: 3 Years Ago	NOW	Near Future 2-3 Years
Connectivity	Location based (Work / Home)	Device based	Ubiquitous
Applications	Few	Many	Lots
Time to Deliver New Services	Telecom: 18 months	Internet: 6 months	Social: Overnight
Information	Disjointed	Analytics	Intelligence: Network+Analytics +Policy

How Does the Networking Business Evolve?

What's Needed: A "Network of Services"
Characteristics of The Next Generation Internet

MONETIZE NEW EXPERIENCES

Mobility Part of Every Networked Experience

More Mobile

More Visual

Personal, Social, Interactive

Next Gen Internet

Ease of Use Commands Premium

More Simple

More Virtual

Blurring the Boundaries Between Network and Cloud

OPTIMIZE THE INFRASTRUCTURE

Market Driven Innovation & Organization alignment

Cost per subscriber

Gap Drives Innovation & Organization

Revenue per subscriber

H.E.R.O.
High End Routing & Optical Group

Innovation Across All Layers

L1 **L7**

Optical Integration
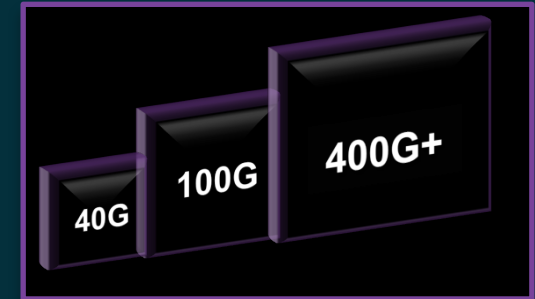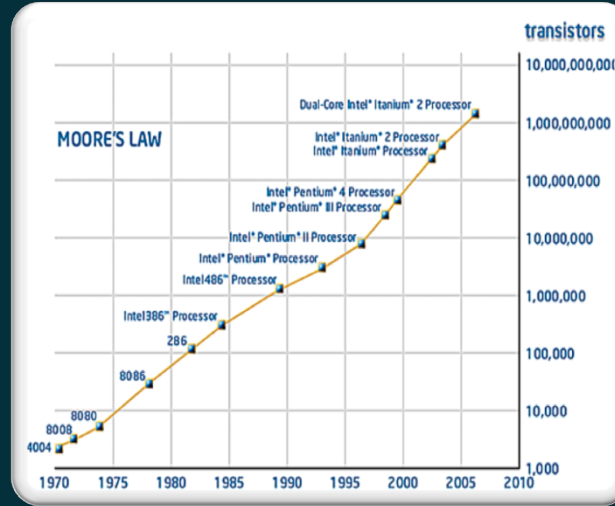
Power & Cooling

Integrated Applications

Improved Silicon

Software Defined Networking

Operational Efficiency

Disruption at L 1-3: Optimizing Around Optical & Silicon System Investments

LIGHTWIRE™

Core Optics

CMOS Photonics **enables integration of optical building blocks** (waveguides, modulators, mux/demux etc.) **onto a small CMOS die**
Best in class **DSP & Chip Integration**
FlexSpectrum: trade off B/W reach and payload rate

MOORE'S LAW

transistors

Dual-Core Intel® Itanium® 2 Processor
Intel® Itanium® 2 Processor
Intel® Itanium® Processor
Intel® Pentium® 4 Processor
Intel® Pentium® III Processor
Intel® Pentium® II Processor
Intel® Pentium® Processor
Intel486™ Processor
Intel386™ Processor
286
8086
8080
8008
4004

10,000,000,000
1,000,000,000
100,000,000
10,000,000
1,000,000
100,000
10,000
1,000

1970 1975 1980 1985 1990 1995 2000 2005 2010

40G   100G   400G+

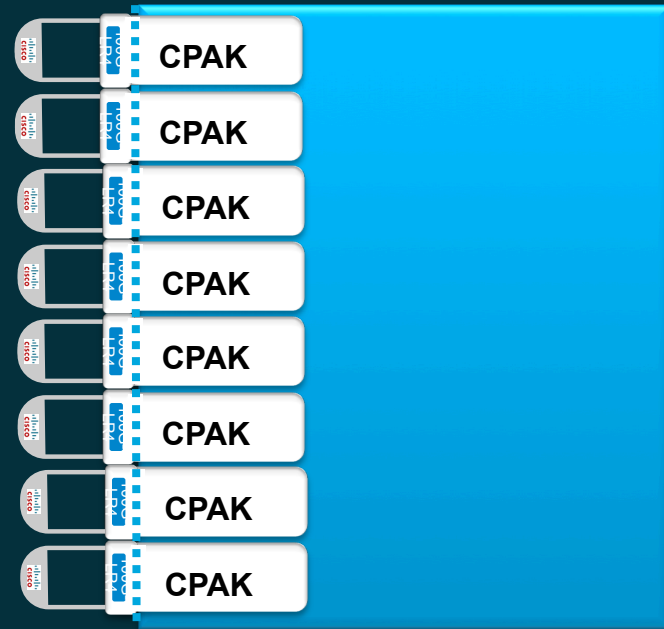- Aggressive Moves to **Advanced Geometries**: 90nm -> 55nm -> 28nm -> 22nm

- **Silicon integration**

- Advanced **Cooling & Power Savings** Techniques
- **Maximized Throughput** per Device

Disruption at L1-3 Cisco CPAK vs CFP Port Density
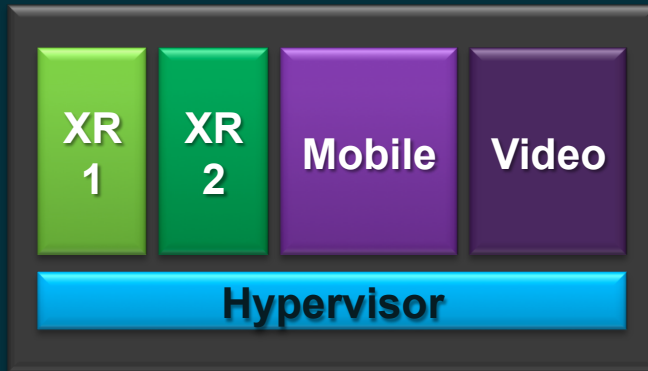
Current Generation

CFP

CFP

Next Generation

CPAK

CPAK

CPAK

CPAK

CPAK

CPAK

CPAK

CPAK
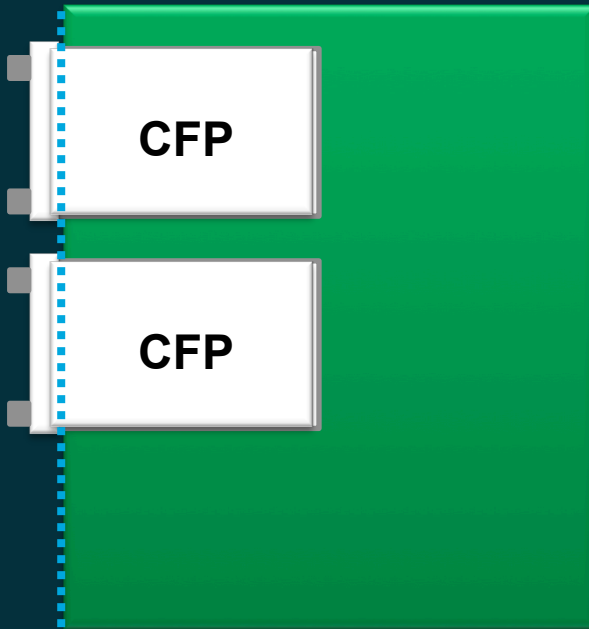
Flexible

IEEE Compliant

< 1/3 Power

< 1/3 Footprint

> 5x Density

Disruptive Evolution of NGI Software

1

XR 1 | XR 2 | Mobile | Video

Hypervisor

Operating System Infrastructure

- HA & Modular distributed OS with Process Restartability & hitless patch ability
- Increased Reliability: Independent Admin. Plane
- OS Virtualization Infrastructure to enable ZPL & ZTL Upgrades

2

Video | Busines | Mobility

Application Virtualization

Cloud | Network | Client

Core / Edge / Agg / Access / Optical

Network Virtualization

Application / Network Services Infrastructure

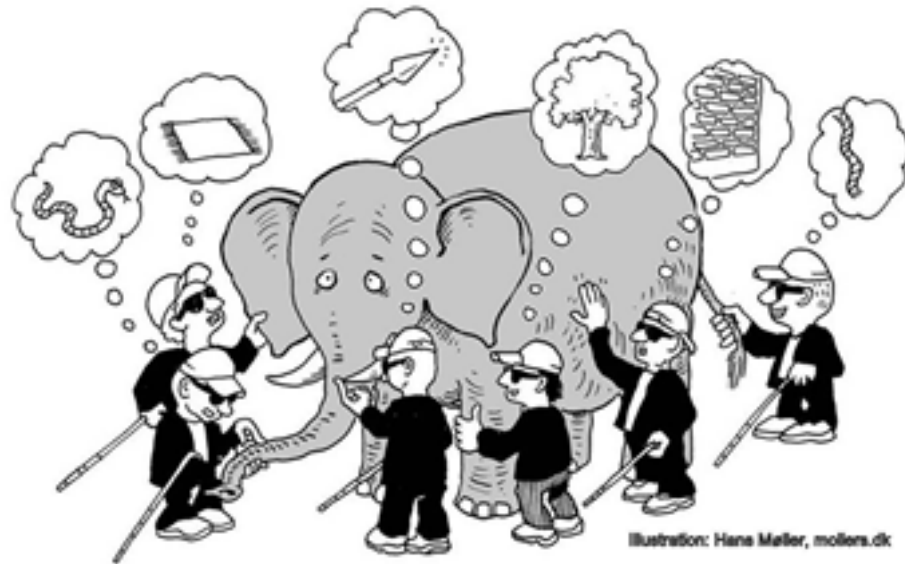- Integrated Application Specific Blade Architectures
- Scalable Datacenter Based Services
- Dynamic, Secure, Elastic, & Orchestrated Services Ecosystem with Virtualization & SDN
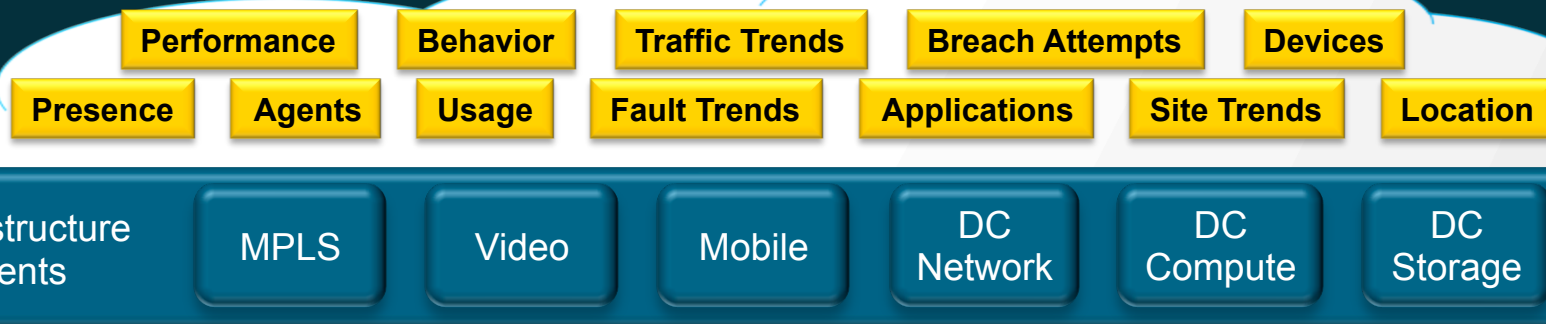
Disrupting beyond the layers: The SDN elephant

SDN – Evolving Definition

Illustration: Hans Møller, mollers.dk

SDN: The Path to Increased Value
Tapping into the Network's Vast Store of Information

World's Largest Gold Mine

| Performance | Behavior | Traffic Trends | Breach Attempts | Devices |
| Presence | Agents | Usage | Fault Trends | Applications | Site Trends | Location |

| Infrastructure Elements | MPLS | Video | Mobile | DC Network | DC Compute | DC Storage |

Bringing the Network to Applications

Disrupting beyond the layers: Harness Network Value

CHECK

POLICY

Orchestration

ANALYTICS

Program for Optimized Experience

Programmability

Intelligence

Harvest Network Intelligence

SET

GET
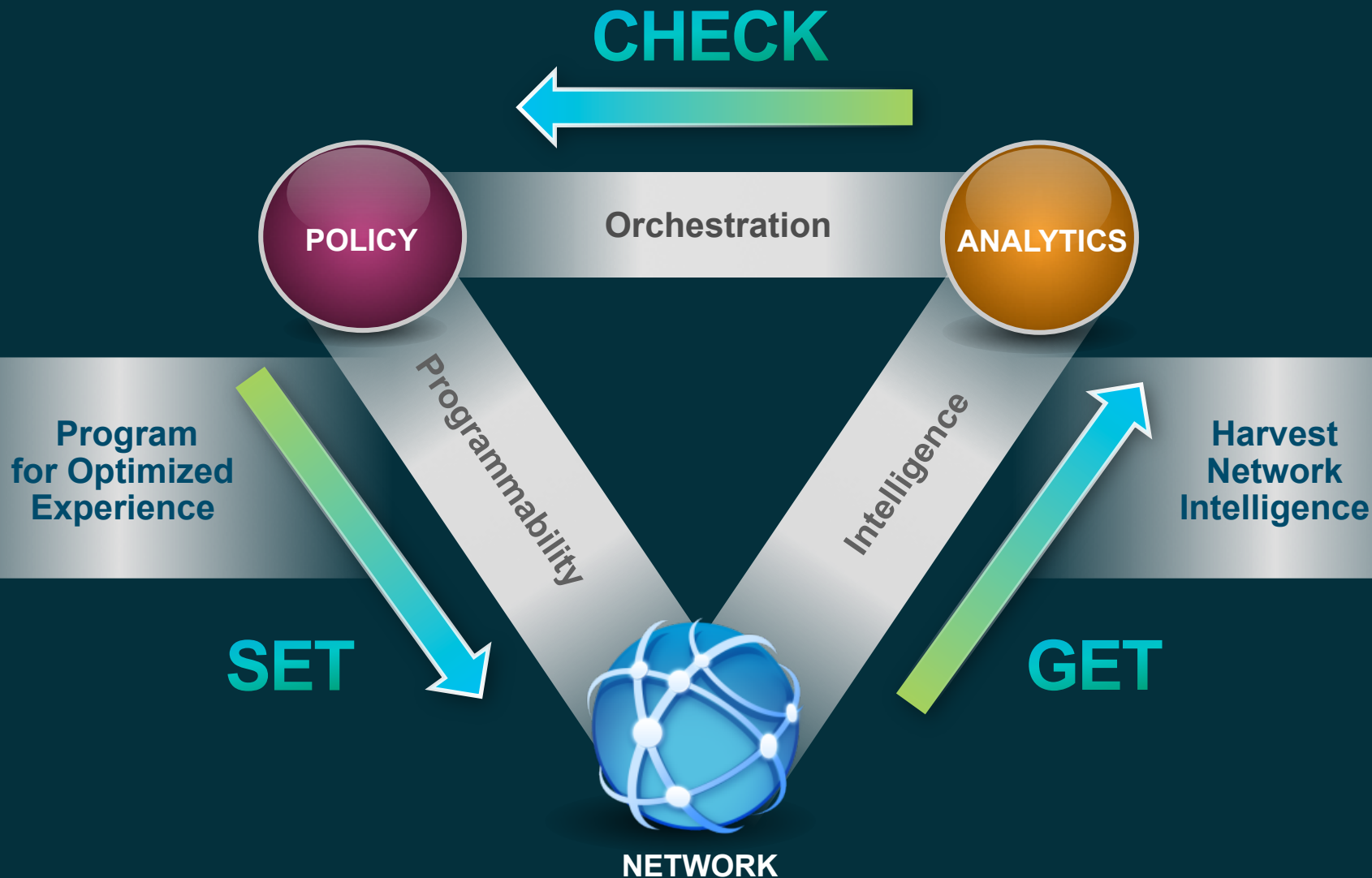
NETWORK

Disrupting beyond the layers : Turning SDN into Reality

Applications

- Analytics
- Policy Servers
- OSS/BSS
- ...
- User App

Orchestration

Other Controllers

OpenFlow Controller

OnePK Applications

VSM

4 SDN controllers
Can be hosted on external servers or VSM service blade

3 Application Virtualization
VSM/Forge

Other protocols (e.g BGP FlowSpec, PCEP,...)

OpenFlow Protocol

OnePK API

- Other agents ...
- OpenFlow Agent
- OnePK Agent

2 Common APIs and SDK
OnePK Agent
Experimental OpenFlow Agent

OnePK API Layer

- Management Plane
- Control Plane
- Data Plane
  - Policy
  - Fwd
  - Flows

1 SDN Enabled Data Plane:
Flexible, programmable, Policy Based Forwarding (E-PBR, Flow mgmt.)

Harvest Network Intelligence

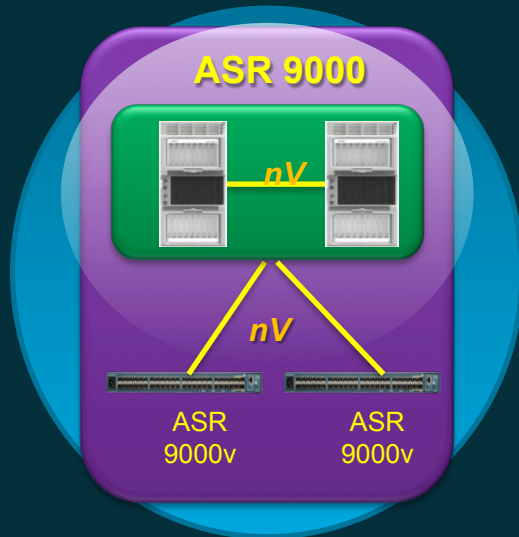**Program Policies for Optimized Experience**

ASR 9000 / CRS-3

Networks are Complex ☺

Disrupting beyond the layers Operationally Simple Networks: OPEX Savings through Cisco nV

"network Virtualization"

ASR 9000

nV

nV

ASR 9000v

ASR 9000v

Simplified Operations

Multi-dimensional Scale

Increased Service Velocity

Example: Cell Site Router Installation

nV cuts truck roles in half to 3

- **Router Physical Installation**

- **Power and Data Cabling**

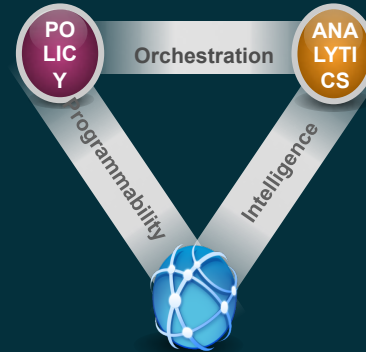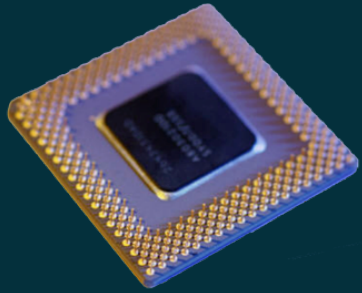- **Router Configuration**

- **EVC SLA Testing**

- **Ready for cut-over**

Zero Touch Deployment

Simplicity

OpEx Savings

NGI Key Investments

Custom Silicon	Optics	Software	Operations
New COT Design	**Grey & DWDM**	**Evolving the NGI SW Foundation**	**Simplicity in Operation**
Ultra-high density, single chip Power efficient NPU, DSP, Optical Integration	100G+ Investment Silicon Photonics CPAK: Optimized Density / Power Flex-ROADM / Flex-spectrum	Integrated Virtualization Service Ecosystem Carrier Class - ZPL/ ZTL	nV (Network Virtualization) Tangible OPEX savings Less Time-to-Deployment

Bringing it all together

Profit = Revenue - Cost

SP NGN

Network Management
Greater Visibility
Greater Control

Operations
Simplicity: Manage Operations with Smaller Budget

Sales/BD
Service Creation: Monetize New Dynamic Services

Purchasing/CFO
Cost Optimization

Technology
Innovation at all Layers of stack - Sustained Competitive Advantage

Thank you.